

**CDM**

environmental engineers, scientists,  
planners, & management consultants

CAMP DRESSER & MCKEE INC.

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July 11, 1988

Mr. Jim Pendergast (6H-EE)  
U.S. Environmental Protection Agency  
Allied Bank Building, 10th Floor  
1445 Ross Avenue  
Dallas, TX 75202

RE: South Cavalcade Pump Test

DOC. CTRL. NO.: 143-TS1-EP-GJAE-1

Dear Mr. Pendergast:

Gordon McCurry performed oversight activities at the South Cavalcade Site in Houston, Texas, on June 14-16, 1988. A summary of the field work is enclosed.

As a follow-up, Keystone will be sending the water level data from the pump test to Gordon. He will perform a preliminary test data analysis and we will forward the results to you in the near future.

Sincerely,  
CAMP DRESSER & MCKEE INC.

*S. Lynn Mays*  
for S. Lynn Mays, P.E.  
Site Manager

LM:ta

ENCLOSURE

*File with Oversight file*  
*Compliance*

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MEMORANDUM

TO: Lynn Mays *GM*  
FROM: Gordon McCurry  
DATE: July 5, 1988  
PROJECT: EPA Contract No.: 68-01-6939  
DOCUMENT NO.: 143-TS1-IO-GGBN  
SUBJECT: Trip Report for Oversight Activities at the South Cavalcade,  
Houston RI/FS Site

Field activities were undertaken at the South Cavalcade site by Koppers Company and their representatives during the period June 13-16, 1988. These activities included well and piezometer installation, plugging an off-site monitor well, conducting an aquifer pumping test, and measuring non-aqueous phase liquids in selected shallow zone monitor wells. As part of EPA oversight activities at the site, Gordon McCurry, CDM hydrogeologist, was present June 14-16 to observe the above field work. The Koppers field crew consisted of site geologist Ken Stroebel from Keystone Environmental Resources, Wayne Turney from MacBride-Radcliff and Associates, and drillers from Layne-Western. The following discussion summarizes the well installation, plugging and pumping test field activities. A copy of the detailed field notes is attached.

A. WELL INSTALLATION, COMPLETION AND DEVELOPMENT (June 14-15, 1988)

Three wells were installed for the purpose of conducting an aquifer pumping test in the shallow zone aquifer. These wells are located in the west-central portion of the site, as indicated on Figure 1. Drilling was undertaken with a CME-55 drill rig using six inch I.D. hollow stem augers. A five-foot continuous coring device was used to obtain stratigraphic information from the first two boreholes and to monitor cuttings for organic vapors. No organic vapors were detected above background levels so Level D health and safety precautions were followed. All cuttings were drummed. Borehole core and cuttings samples indicated subsurface stratigraphy to be similar in all three boreholes and can be summarized as:

0-2'	dark brown to black organic-rich soil
2-10'	silty to sandy clay, with silty laminations; dry
10-11'	clayey fine sand; moist
11-18'	clayey silt to fine sand; saturated
> 18'	clay, plastic

The well completions were similar to each other and consisted of a ten foot screened zone extending from approximately 8 to 18 feet below ground with a

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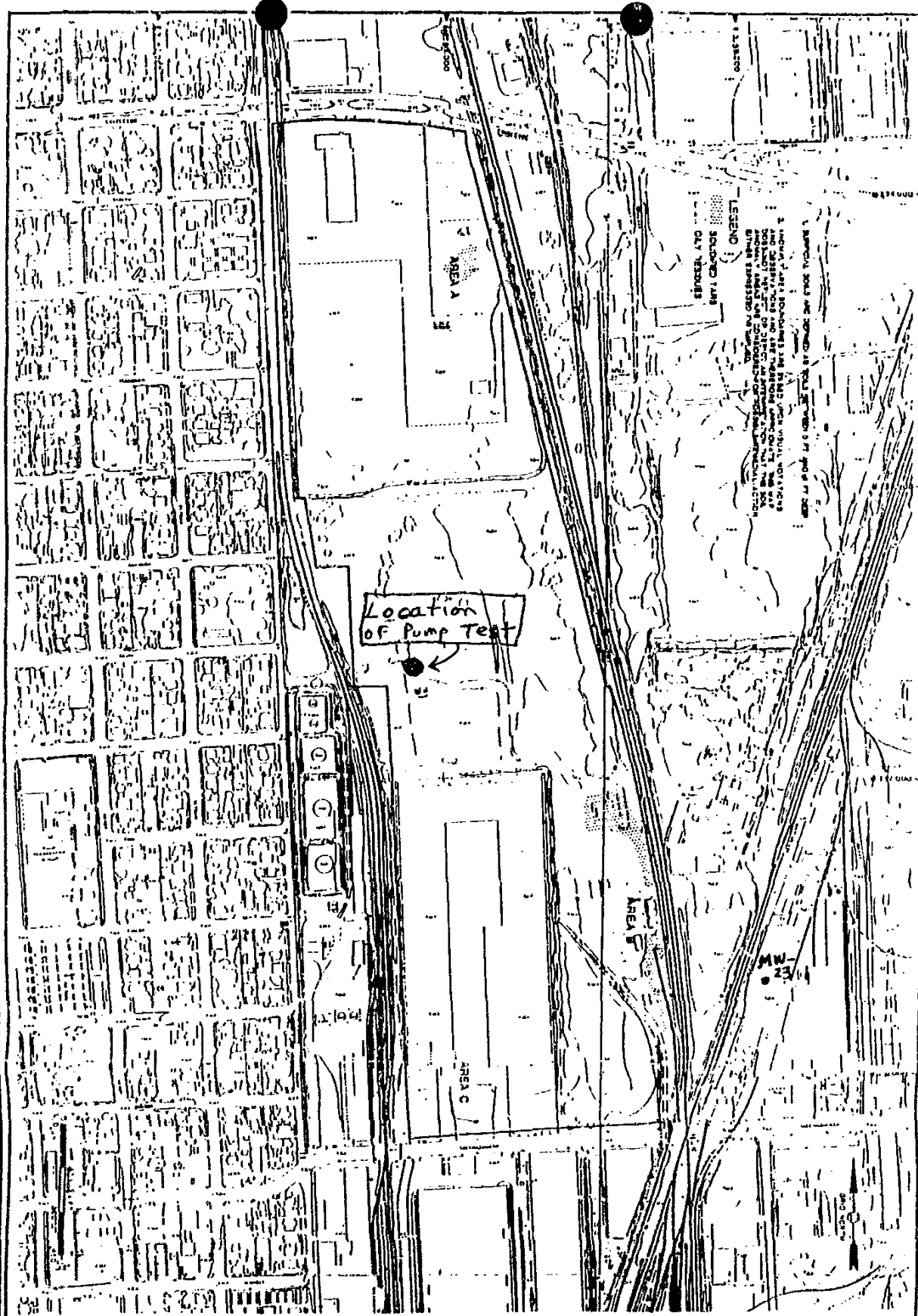


FIGURE 1 -  
Site Location Map

1. 姓名: 李小明  
 2. 性别: 男  
 3. 年龄: 25  
 4. 职业: 教师  
 5. 住址: 北京市朝阳区  
 6. 联系电话: 13800138000  
 7. 电子邮箱: xiaoming.li@example.com  
 8. 身份证号: 110101199801010001  
 9. 学历: 本科  
 10. 毕业院校: 清华大学  
 11. 工作单位: 北京市教育科学研究院  
 12. 入职日期: 2018-01-01  
 13. 工资等级: 中级  
 14. 社保缴纳: 正常  
 15. 公积金缴纳: 正常  
 16. 健康状况: 良好  
 17. 婚姻状况: 未婚  
 18. 家庭成员: 父母健在  
 19. 紧急联系人: 李小红  
 20. 紧急联系电话: 13900139000

**SOUTH CAVALCADE SITE**  
**HOUSTON, TEXAS**  
**KOPPENS COMPANY, INC.**

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ten foot section of solid casing above that. All wells were constructed with schedule 40 PVC casing and factory-slotted screen. Two wells served as piezometers or observation wells and were constructed with two-inch I.D. PVC casing and screen. The easternmost of the three installed wells served as the aquifer test pump well and was constructed with four inch I.D. casing and screen. All wells were completed inside the augers and consisted of a well graded blasting sand that extended to approximately one foot above the screen, overlain by a foot of bentonite pellets then a 90% cement/10% bentonite flour grout mixture. The grout was pumped downhole via tremmie pipe until grout returns were seen at the surface. Locking steel casings were placed over the PVC stickups. All downhole equipment, drilling and casing materials had been decontaminated by steam cleaning and had been wrapped or covered in plastic. These materials were also steam cleaned at the on-site decontamination pad after use. All wash water derived from decontamination activities was pumped into a large holding tank located inside a fenced decontamination yard.

The pump well, designated KER-1, was located approximately 8 and 35 feet away from the observation wells, designated KER-2 and KER-3, respectively. The pump well was several feet out of line with the observation wells due to an underground pipe encountered during drilling at the original in-line location.

Well development of KER-1 occurred a day after well completion activities. Development was first attempted by air surging although almost no water exited the well and piping system into the receptor drums. This continued after several attempts until water and air were observed to be coming out of the ground from a small rodent hole located several feet from the well. Well development by air surging was then discontinued, and was replaced by bailing.

Bailing was successful, but slow, so a 1/2 horsepower Grundfos submersible pump was lowered downhole. The pump ran for approximately 20 minutes at 3 to 4 gpm then for 10 to 15 minutes at 1.25 gpm. The purge water became increasingly clear during this time, but remained slightly cloudy. Approximately 50-60 gallons of water were purged from well KER-1, with most of it being drummed. No development activities were attempted at observation wells KER-2 or KER-3.

**B. MONITOR WELL MW-23 PLUGGING AND ABANDONMENT (June 15, 1988)**

The field crew moved off-site to remove and grout up monitor well MW-23 (see Figure 1). The drill rig set up over well MW-23 after the flush-mounted cap and concrete cover were removed. Four inch I.D. hollow stem augers were used to drill through the subsurface grout surrounding the two inch I.D. PVC casing of MW-23. The drillers were able to pull most of the reportedly 44 feet of well string out of the ground. A 90% cement/10% bentonite flour grout mixture was pumped downhole inside the augers via tremmie pipe. Auger removal alternated with grout being pumped downhole, with returns seen at the surface, until all of the augers were pulled. Cuttings and former well materials were drummed.

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C. AQUIFER PUMP TEST (June 16, 1988)

The aquifer pumping test was a constant discharge drawdown and recovery test. Water levels in each of the three wells was monitored by both an EnviroLabs automated Data Logger and manual observations with electric well lines or steel tape. Static water levels were recorded before the submersible pump and data logging devices were placed in the wells. The pump test began after a return to static water levels following placement of downhole equipment. A pumping discharge rate of 1.25 gpm was maintained during the test and was periodically monitored by using a stopwatch and bucket. All purge water was routed through a garden hose to a large holding tank located inside a fenced decontamination yard.

After approximately 100 minutes into the test, it was noted that air could periodically be heard entering the pump intake. This condition existed until the pump was turned off, after an elapsed time of 130 minutes. The maximum drawdowns observed were 6.05 feet in the pump well (KER-1), 1.18 feet in well KER-2 and 0.30 feet in well KER-3. Water level recovery measurements were recorded for 160 minutes after the pump was turned off, with water levels returning to within 0.2 feet of the static water levels in all wells.

D. GENERAL COMMENTS

1. Site health and safety precautions and decontamination procedures implemented during the course of the field activities appeared to be adequate and appropriate.
2. All field procedures and well installation activities which were observed appeared appropriate and were conducted in a timely and professional manner.
3. Pump discharge measurements should have been undertaken at more frequent intervals than they were during the aquifer test, particularly when air was heard entering the pump intake valve. It is suspected that the pump rate fluctuations may have been significant, at times, relative to the initial pumping rate.
4. The recovery portion of the aquifer test should have continued for a longer period of time. Although the pump well and nearest observation well had recoveries by the end of the test to within about 3 and 16 percent of the static water levels, respectively, the farther observation well had recovered to only within about 60 percent of its static water level. Additional recovery data would have allowed the results from well KER-3 to be more useful and usable.

Water level data from the pump test will be sent to me by Ken Stroebe of Keystone Environmental Resources in the near future. I plan on working up the data and will send you the results of my preliminary aquifer test data analyses under a separate memo. Please don't hesitate to contact me if you have any questions prior to that time.

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7777-143-TS1-PL-GFTP

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This book is published on a fine 50% cotton-content ledger paper,  
specially treated for maximum archival service, and protected by  
a water resistant surface sizing.

Index

Oversight of well and  
piezometer installation and  
shallow aquifer pumping  
test, June 14-15, 1988  
South Cavalcade RIDFS  
site, Houston TEXAS

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Monday, June 13, 1988 -

8:30 pm - Left Denver for Houston. Reviewed RZ.  
 12:30 am - Arrived Houston. Left for hotel.  
 1:30 am - checked into hotel; prepared for AM  
 Field work.

000002

Tuesday, June 14, 1988 Warm, muggy

0830 Arrived at Merchant's Trucking  
 Company. Talked with Ed - grounds  
 manager - about access to property  
 near well OW-9.

0900 Arrived at site. Met  
 • Ken Stosbel - Keystone/Koppers  
 • Wayne Turner - MRA  
 • Layne-Western drillers (Sonny & Nield)

0915 Field crew was just finishing  
 completion of the second  
 piezometer. Extremely clayey.

Both piezometers installed  
 to 18 ft. Ken said they  
 hit the Lisse Clay at 17-17.5.

Design is to have one piezometer  
 at 5 ft from the pumping well;  
 the second piezo. will be at  
 30 ft. Piezometers are 2" ID PVC  
 schedule 40, 10 ft screen, 10' casing  
 Drilling of the pump well  
 began.

0900 6

000003

Drilling is with a 6 inch ID hollow stem auger. The piezometers were also augered with a 6" ID HSA. They were samples (for stratigraphic info) with a 5 ft continuous coring device.

Ken indicated both piezometer boreholes had similar stratigraphy:

- 0-10 ft sandy clay
- 10-11 ft clayey fine sand wet
- 11-17 ft v. fine to fine clean sand
- 17-18 ft clayey fine sand
- 18+ ft clay plastic

1005 Drillers encountered a buried pipe at ~2 ft depth. HCU reading = background

Health & Safety at site:

Level D: Hard hats, eyewear, steel toed boots. A plastic sheet was spread out on ground around drillhole & drums. Cuttings placed directly in drums

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1012 Drill rig moved - is now approx 7 ft from piezo #1 and 32 ft from piezo #2 in line with both. Drilling beginning over

Description of cuttings:

- 0-3' dark brown-black organic rich soil
- 3-12' clayey sand. Sand very fine to fine in a plastic clay matrix generally buff color, with light orange-brown laminations ~1 mm thick. Laminations ~3 mm apart, composed of silty - v. fine sand
- 12-18' Grey to buff color, clayey silt to fine sand, saturated. No apparent bedding

1035 Drilling completed to approx 19 ft

06367  
1045 Began installation of 4 inch



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ID mill-slot screened PVC.  
Pulled augers up to 15 ft, backfilled  
with sand.

Well casing is 10 ft of slotted  
screen with 10 ft of solid 4 inch  
ID PVC casing, Schedule 40. All  
PVC deconned yesterday; plastic wrapped  
Sand poured inside augers  
Sand is TEXBLAST Blasting  
Sand, a poorly-moderately sorted  
(well graded) Fine to coarse sand  
of quartz & feldspar xstls



Completion is sand 10 ft  
water table (water table  
encountered approx. at  
contact of sandy clay &  
the underlying clayey sand -  
shallow aquifer may be partially  
confined/semi confined)  
clay bentonite pellets above  
that (at least one foot),  
Bentonite slurry/grout above  
that to the surface.

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1120 Drillers completed well up through  
water table; stopped to get  
lunch

1130 left drill site; stopped by Merck  
Trucking to inform Ed of my departure  
and tell him he could lock the gate

1200 Returned to site. Followed Ken  
in via Transco Trucking, from  
Cavalcade Street. Crew mobilizing

1245 Layne-Western crew preparing  
grout mixture. Grout is 90%  
portland cement, 10% bentonite  
flour

1300 Pump to mix the grout broken  
down. Grout mixture stirred  
by bucket & poured down hole  
by bucket

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1315 Finished grouting (a) the pump well  
(b) both piezometers (c) the initial 2.5'  
hole for the pump well (drill hit  
a pipe underground)

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Placed protective steel locking casings over PVC stickup. Poured grout in hole to surface.

1340 Ken Strobel indicated they would finish today developing the well & piezometers; tomorrow they will start to pull well MW-23 (SE of the S. Cavalcade site) and begin the pump test by late morning.

KeyStone also needs to assess the NAPL situation in several of the wells on-site (thickness, location in well) before completing activities at South Cavalcade.

1430 Layne-Western and MRA deconned augers & grout mixing equipment on the concrete decon pad. Used a steam cleaner to decon all equipment.

1440 Ken Strobel left for several hours to make office calls. He said they would finish decon and quit early today. All parties will meet at decon pad

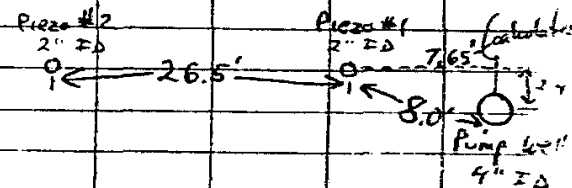
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tomorrow at ~7.30 A.M.

1500  
~~1450~~

Left South Cavalcade site to make office calls and work up conceptual pump test drawdown results.

Pump and piezometer geometry:



Saturated thickness: 7-8 ft

Semi-confined ~~at~~ to confined conditions likely.

Hydraulic conductivity:  $10^{-5}$  -  $10^{-6}$  cm/sec. likely (Clayey fine sand)

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Wednesday, June 15, 1988

0715 Arrived on site. Weather: warm, humid. Ken Strubel introduced a Koppers/Kegelna Field person who will be helping run the pump test: Mark Valerio

Also present was Aaron of MRA.

Discussed MW-23 plugging techniques

0745 Layne-Western crew arrived. The plan is to develop the pump well and piezometers(?) by air-lifting.

0810 Drill crew left to get an adapter for the air compressor.

0820 Driller returned and said the adapter would arrive in about an hour. Ken Strubel decided to move to MW-23 and pull + grout the well.

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0915 Drill rig set up over MW-23; surface grout and protective casing pulled; 4 inch ID hollow stem augering around the 2" ID POC casing initiated.

1000 PVC casing pulled out of hole. Drill crew left to get H<sub>2</sub>O and grout mix to plug hole

1045 Drill crew returned with supplies. They commenced to pull the augers and grout down-hole.

1215 Driller pulled 20' auger out of ground. Left to make up more grout. Returned at 1230

1330 Driller finished grouting well/borehole MW-23. Started cleanup

1410 Site cleanup finished. Field crew moved to pump test site

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1500 Attempted to develop the pump well by air surging. very little H<sub>2</sub>O coming out of well.

1530 Discovered a hole approx 5 ft from pump well where air and water were observed to come out of ground when air compressor was turned on. Ken Strobel decided bailing was required to remove some of the fines from the pump well.

1630 Devised a bailer by using 2" ID PVC casing, cut off at 13 ft. Screwed on an end cap and drilled holes at other end to attach a rope.

Purge water coming out very muddy still, after removing about 20 gallons of H<sub>2</sub>O and drumming it. Decided to attempt to use the 1/2 gpm pump that will be used for the pumping test to purge the well.

1715 The 1/4 horsepower pump that was

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placed downhole didn't have enough lift to pull water out of the well.

1735 Ken Strobel is going to attempt purging the well with their Grundfos submersible pump. He thinks he can throttle it back to a low enough y/c (~1 gpm) to avoid instant dewatering.

1905 The 1/2 HP submersible pump ran for ~ 35-40 min; at 3.6 gpm (for 25 min) then for 10-15 min at 1.25 gpm. Purge water became increasingly clear but remained cloudy. Decided to conduct pump test tomorrow. Will pump at 1-1.5 gpm for 4-6 hrs, then increase pump rate until well goes dry, then let it recovery. All purge H<sub>2</sub>O went into drain.

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Agreed to meet at 0700 tomorrow

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Thursday, June 16, 1988

0710 Arrived on site. Weather: sunny, warm (~80°). Waited for Ken Stöbel and Mark Valero of Keystone to arrive.

0715 Helped Keystone crew set up for the pump test. Will measure static water level in pump well, then place 4" submersible pump in well. Rest of setup will occur while water level in pump well is re-equilibrating.

0718 Static water level = 9.63 from PVC stickup. Measured with a Geo Store electric well line (by Brainard-Kilman). Plastic measuring tape marked to the nearest 0.02 feet.

0730 SWL in Piezo #1 = 9.32  
SWL in Piezo #2 = 9.35

0742 Pump well = KER-1  
Piezo #1 = KER-2  
Piezo #2 = KER-3

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0750 An Enviro Labs Data Logger will be used to monitor ~~the both~~ <sup>the</sup> ~~static~~ <sup>the pump well</sup> piezometer and ~~the pump well~~ <sup>(well KER-3)</sup>. The electric well lines will be used for ~~the newer piezometers~~ <sup>to double-check the data</sup> logger.

0800 Waiting for the piezometers to equilibrate to SWL.

0840 Submersible pump turned on. Discharge rate adjusted to be constant at 1.25 gpm. Purge water routed through garden hose to a large H<sub>2</sub>O holding tank, located in MRA's fenced equipment yard.

0837 Ken Stöbel, Mark Valero and I manned the pump well, Piezo #1 and Piezo #2, respectively, and took measurements manually.



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1050 - Pump turned off. During the previous 30 minutes, the sound of air entering the pump intake could be heard, periodically. Discharge measurements made during this time showed no change in the pump discharge rate - still 1.25 gpm.

Water level recovery measurements initiated on the pump well and on both piezometers

1215 Left site to contact Lynn Mays, CSM/  
Austin, regarding South Cavalcade RI  
revised Chapter 7 review comments,  
and to check out of hotel.

1425 Returned to northern access fence of  
TRANSCORP trucking company. Fence  
locked. Waited for Keystone crew to  
return and plotted up Piezo #1 data.

1515 Keystone crew hadn't arrived. Drove  
thru south portion of site - along  
Collinsworth & Assoc. trucking companies.

1530	Did not see key stone crew. Left South Cavalcade site for airport.
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TIME	Stick up Load	Water mark	Depth to Water	Drain
02:40.0	10.0	0.69	931	
02:41.0	10.0	0.70	930	
02:42.0	10.0	0.72	928	
02:43.0	10	0.69	933	
02:44.0	10.0	0.70	930	
02:45	10.0	0.70	930	
02:48	10.0	0.68	932	
02:50	10.0	0.68	932	
02:52	10.0	0.67	933	
02:54	10.0	0.67	933	
02:56	10.0	0.67	933	
02:58	10.0	0.66	934	
03:00	10.0	0.66	934	
03:02	10.0	0.65	935	
03:04	10.0	0.64	936	
03:06	10.0	0.64	936	
03:08	10.0	0.64	937	
03:10	10.0	0.64	937	
03:12	10.0	0.64	937	
03:14	10.0	0.64	937	
03:16	10.0	0.64	937	
03:18	10.0	0.64	937	
03:20	10.0	0.64	937	
03:22	10.0	0.64	937	
03:24	10.0	0.64	937	
03:26	10.0	0.64	937	
03:28	10.0	0.64	937	
03:30	10.0	0.64	937	
03:32	10.0	0.64	937	
03:34	10.0	0.64	937	
03:36	10.0	0.64	937	
03:38	10.0	0.64	937	
03:40	10.0	0.64	937	
03:42	10.0	0.64	937	
03:44	10.0	0.64	937	
03:46	10.0	0.64	937	
03:48	10.0	0.64	937	
03:50	10.0	0.64	937	
03:52	10.0	0.64	937	
03:54	10.0	0.64	937	
03:56	10.0	0.64	937	
03:58	10.0	0.64	937	
04:00	10.0	0.64	937	



000017

Time 000000 - WL Mark = Depth 10

918	100	0.61	9.39
920	100	0.50	9.40
925	100	0.59	9.41
930	100	0.58	9.42
935	100	0.56	9.44
940	100	0.56	9.44
950	100	0.54	9.46
1000	100	0.52	9.48
1010	100	0.48	9.52
1020	100	0.46	9.54
1030	100	0.43	9.57
1040	100	0.41	9.59
1050	100	0.40	9.60
1051	100	0.39	9.61
1052	100	0.38	9.62
1053	100	0.39	9.61
1054	100	0.39	9.61
1055	100	0.39	9.61
1058	100	0.40	9.60
1100	100	0.41	9.59
1102	100	0.43	9.57
1104	100	0.43	9.57
1107	100	0.44	9.56
1110	100	0.45	9.55
1115	100	0.47	9.53
1120	100	0.48	9.52

000018

Time 000000 - WL Mark = Depth 10

1130	100	0.48	9.52
1140	100	0.49	9.51
1150	100	0.49	9.51
1210	100	0.50	9.50

006374